The importance of interoperability in European green corridors

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National Technical University of Athens
Overview

- What is a green corridor
- Key Performance Indicators (KPIs)
- Interoperability and KPIs
- Corridor benchmarking
- Conclusions
What is a green corridor?

EU Commission:

- Green Corridors are a European concept denoting long-distance freight transport corridors where advanced technology and co-modality are used to achieve energy efficiency and reduce environmental impact.
What is a green corridor?

• Definition by the Swedish Ministry:
  A green transport corridor is characterised by:
  
  – Sustainable logistic solutions
  – Integrated logistic concepts with utilisation of comodality
  – A harmonised system of rules
  – National/international goods traffic on long transport stretches
  – Effective and strategically placed transshipment points and infrastructure
  – A platform for development and demonstration of innovative logistic solutions
The SuperGreen project

• Theme title: Transport (including Aeronautics)
• Type of project: Coordination and Support Action
• Project full title: Supporting EU’s Freight Transport Logistics Action Plan on Green Corridors Issues
• Project acronym: SuperGreen
Objectives

- **Support and recommendations** on Green Corridors to EU’s Freight Transport Logistics Action Plan.
- **Encourage co-modality** for sustainable solutions.
- **Overall benchmarking** of Green Corridors based on selected KPIs covering all aspects related to transport operations and infrastructure (emissions, internal and external costs).
- Conduct a programme of *networking activities between stakeholders* to facilitate information exchange, dissemination of research results and communication of best practises and technologies.
Objectives, contd.

• *Deliver studies* addressing topics important for the further development of Green Corridors.

• *Deliver policy recommendations* at a European level for the further development of Green Corridors.

• Provide *recommendations concerning new calls for R&D proposals* to support development of Green Corridors (eliminate bottlenecks).
The consortium

<table>
<thead>
<tr>
<th>Partner Number</th>
<th>Partner name</th>
<th>Partner short name</th>
<th>Country</th>
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<tr>
<td>1 (Coordinator)</td>
<td>National Technical University of Athens</td>
<td>NTUA</td>
<td>Greece</td>
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<td>Norsk Marinteknisk Forskningsinstitutt AS, MARINTEK</td>
<td>MAR</td>
<td>Norway</td>
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<tr>
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<td>Sito Ltd (Finnish Consulting Engineers Ltd)</td>
<td>SITO</td>
<td>Finland</td>
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<td>PAG</td>
<td>Spain</td>
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<td>via donau Österreichische Wasserstraßen-Gesellschaft mbH</td>
<td>VIA</td>
<td>Austria</td>
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<td>Belgium</td>
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<td>Lloyd's Register-Fairplay Research</td>
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<td>Greece</td>
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<td>Germany</td>
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Duration & budget

• Official start: 15 Jan. 2010
• Duration: 3 years
• Total budget: 3,453,747 EUR
• EC contribution: 2,634,698 EUR
SuperGreen work package structure

- **WP1** Management
  - Task 1.1 Financial & administrative coordination
  - Task 1.2 Strategic coordination
  - Task 1.3 Review & assessment

- **WP2** Benchmarking Green Corridors
  - Task 2.1 Select corridors
  - Task 2.2 Define benchmark indicators & methodology
  - Task 2.3 Effects of changes in operational & regulatory environment
  - Task 2.4 Benchmark green corridors
  - Task 2.5 Define areas for improvement

- **WP3** Sustainable Green Technologies & Innovations
  - Task 3.1 Identify green technologies
  - Task 3.2 Define application areas for green ICT
  - Task 3.3 Benchmark green corridors with green technology

- **WP4** Smart Exploitation of ICT-flows
  - Task 4.1 Identify smart ICT and available information flows
  - Task 4.2 Define application areas for smart ICT
  - Task 4.3 Potential of Green Supply Chain Management
  - Task 4.4 Benchmark green corridors with smart ICT

- **WP5** Recommendation for R&D Calls
  - Task 5.1 Identify unsolved bottlenecks
  - Task 5.2 Define & submit R&D call recommendations

- **WP6** Policy Implications
  - Task 6.1 Analysis of Regulatory Framework
  - Task 6.2 Policy Recommendations

- **WP7** Dissemination and Awareness Raising
  - Task 7.1 Dissemination plan
  - Task 7.2 Promotional material
  - Task 7.3 Conferences and presentations

ECITL conference, Thessaloniki, Oct. 13-14, 2011
KPI areas: 5 groups

• Efficiency
• Service quality
• Environmental sustainability
• Infrastructural sufficiency
• Social issues
## KPIs hierarchy

<table>
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<tr>
<th>Category</th>
<th>KPIs</th>
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| Efficiency                       | Absolute unit cost  
Relative Unit cost                                                      |
| Service quality                  | Transport time  
Reliability  
Frequency of service  
ICT applications  
Cargo security  
Cargo safety |
| Environmental sustainability     | CO$_2$-eq  
SOx  
NOx  
PM |
| Infrastructure sufficiency       | Congestion  
Bottlenecks |
| Social issues                    | Land use - urban areas  
Land use - sensitive areas  
Traffic safety  
Noise |
## KPI importance

<table>
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<tr>
<th>KPI</th>
<th>Input unit</th>
<th>Output unit</th>
<th>Grading of importance for Supergreen</th>
</tr>
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<tbody>
<tr>
<td><strong>Efficiency</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute costs</td>
<td>ton, €</td>
<td>€/ton</td>
<td>3 Can manage without</td>
</tr>
<tr>
<td>Relative costs</td>
<td>ton, €, km</td>
<td>€/ton-km</td>
<td>1 Must have</td>
</tr>
<tr>
<td><strong>Service quality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport time</td>
<td>hours</td>
<td>hours</td>
<td>1 Must have</td>
</tr>
<tr>
<td>Reliability</td>
<td>Total number of shipments, On-time deliveries</td>
<td>%</td>
<td>1 Must have</td>
</tr>
<tr>
<td>ICT appl.</td>
<td>Availability, integration &amp; functionality of cargo tracking &amp; other services</td>
<td>graded scale</td>
<td>2 Prefer to have</td>
</tr>
<tr>
<td>Frequency</td>
<td>Services per week</td>
<td>number</td>
<td>1 Must have</td>
</tr>
<tr>
<td>Cargo security</td>
<td>Total number of shipments, Security incidents</td>
<td>%</td>
<td>2 Prefer to have</td>
</tr>
<tr>
<td>Cargo safety</td>
<td>Total number of shipments, Cargo safety incidents</td>
<td>%</td>
<td>2 Prefer to have</td>
</tr>
<tr>
<td><strong>Environmental sustainability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO\textsubscript{2} emissions</td>
<td>ton, km</td>
<td>g/ton-km</td>
<td>1 Must have</td>
</tr>
<tr>
<td>NO\textsubscript{x} emissions</td>
<td>kg, km</td>
<td>g/1,000 ton-km</td>
<td>2 Prefer to have</td>
</tr>
<tr>
<td>SO\textsubscript{x} emissions</td>
<td>kg, km</td>
<td>g/1,000 ton-km</td>
<td>1 Must have</td>
</tr>
<tr>
<td>PM emissions</td>
<td>kg, km</td>
<td>g/1,000 ton-km</td>
<td>2 Prefer to have</td>
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<tr>
<td><strong>Infrastructural sufficiency</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>ton, km, Average delay</td>
<td>hours/ton-km</td>
<td>2 Prefer to have</td>
</tr>
<tr>
<td>Bottlenecks</td>
<td>number &amp; category</td>
<td>graded scale</td>
<td>2 Prefer to have</td>
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<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor land use</td>
<td>Share of distance per area type</td>
<td>percent</td>
<td>2 Prefer to have</td>
</tr>
<tr>
<td>Traffic safety</td>
<td>Traffic safety incidents</td>
<td>percent</td>
<td>2 Prefer to have</td>
</tr>
<tr>
<td>Noise</td>
<td>Share of distance above level</td>
<td>percent</td>
<td>2 Prefer to have</td>
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</table>
Enter Interoperability

• Key element of EU transport policy

• In the strict sense: Focuses on rail transport
• In the broad sense: Applies to all modes and to the supply chain as a whole
Rail patchwork

• At least 4 major gauge systems
• At least 4 major electricification systems
• At least 20 train control systems
• Various clearance systems
• Incompatibilities even between systems that are similar in other respects
Interoperability directive

• Directive 2008/57/EC of 17 June 2008 aims to establish the conditions so as to achieve interoperability within the Community rail system.
• Conditions concern the design, construction, placing in service, upgrading, renewal, operation and maintenance of the parts of this system as well as the professional qualifications and health and safety conditions of the staff.
• The new Directive has superseded as of 19 July 2010 the previous Directive 96/48/EC on the interoperability of the European high-speed rail system as well as Directive 2001/16/EC on the interoperability of the European conventional rail system.
• Two areas:
  – Interoperability of the conventional rail system
  – Interoperability of the high speed rail system.
Technical Specifications for Interoperability (TSIs)

- control/command and signalling
- telematics applications for freight services traffic operation and management (including staff qualifications for cross-border services)
- freight wagons; and
- noise problems deriving from rolling stock and infrastructure.
ERTMS

- European Rail Traffic Management System
- Many different train control systems
- Example: the Thalys train sets running between Paris-Brussels-Cologne and Amsterdam have to be equipped with 7 different types of train control systems
ERTMS components

– ETCS, the European Train Control System, is an automatic train protection system (ATP) to replace the existing national ATP-systems

– GSM-R, a radio system for providing voice and data communication between the track and the train, based on standard GSM using frequencies specifically reserved for rail application with certain specific and advanced functions.
Relevance to green corridors

• Rail interoperability: of paramount importance
• Most of the selected KPIs are significantly influenced by whether or not a rail corridor can function smoothly or not.
• It is speculated that even moderate gains in this department could translate in significant gains for the attractiveness of rail vis-à-vis other, less environmentally friendly modes of transport.
Impact of interoperability on KPIs

• Object of detailed analysis

• However, one can make some predictions

• Relative cost KPI: HIGH
• Transport time KPI: HIGH
• Reliability KPI: HIGH/moderate
• Frequency KPI: HIGH/moderate
• CO2 and SOx KPIs: HIGH/moderate
Interoperability in other modes

• Of equal importance, given drive for co-modality
• Interoperability in conventional technology
• Interoperability in ICT

• A corridor with little or no interoperability cannot be green
# SuperGreen Corridors

<table>
<thead>
<tr>
<th>BRIEF DESCRIPTION - BRANCHES</th>
<th>NICKNAME</th>
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<tbody>
<tr>
<td>Madrid-Gijon-Saint Nazaire-Paris Branch A: Madrid-Lisboa</td>
<td>Finis Terrae</td>
</tr>
<tr>
<td>Cork-Dublin-Belfast-Stranraer Branch A: Munich-Friedewald-Nuneaton Branch B: West Coast Main line</td>
<td>Cloverleaf</td>
</tr>
<tr>
<td>Helsinki-Turku-Stockholm-Oslo-Göteborg-Malmö-Copenhagen (Nordic triangle including the Oresund fixed link) - Fehmarnbelt - Milan - Genoa</td>
<td>Edelweiss</td>
</tr>
<tr>
<td>Motorway of Baltic sea Branch: St. Petersburg-Moscow-Minsk-Klaipėda</td>
<td>Nureyev</td>
</tr>
<tr>
<td>Rhine/Meuse-Main-Danube inland waterway axis Branch A: Betuwe line Branch B: Frankfurt-Paris</td>
<td>Strauss</td>
</tr>
<tr>
<td>Igoumenitsa/Patras-Athens-Sofia-Budapest-Vienna-Prague-Nurnberg/Dresden-Hamburg</td>
<td>Two Seas</td>
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<tr>
<td>Odessa-Constanta-Bourgas-Istanbul-Piraeus-Gioia Tauro-Cagliari-La Spezia-Marseille-Barcelona-Valencia-Sines Branch A: Algeciras-Valencia-Barcelona-Marseille-Lyon Branch B: Piraeus-Trieste</td>
<td>Mare Nostrum</td>
</tr>
<tr>
<td>Shanghai-Le Havre/Rotterdam-Hamburg/Göteborg-Gdansk-Baltic ports-Russia Branch: Xiangtan-Beijing-Mongolia-Russia-Belarus-Poland-Hamburg</td>
<td>Silk Way</td>
</tr>
</tbody>
</table>
SuperGreen Corridors ii
Resemblance with freight-oriented rail corridor network
The corridors in metro format
### Benchmarking results (prelim.)

<table>
<thead>
<tr>
<th>Corridor name</th>
<th>Mode of transport</th>
<th>CO2 (g/km)</th>
<th>SOx (g/km)</th>
<th>Cost (€/km)</th>
<th>Average speed (km/h)</th>
<th>Reliability %</th>
<th>Frequency x times/year</th>
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<td>Brenner</td>
<td>Intermodal</td>
<td>10.62-42.11</td>
<td>0.020-0.140</td>
<td>0.03-0.09</td>
<td>9-41</td>
<td>95-99</td>
<td>26-624</td>
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<td></td>
<td>Rail</td>
<td>46.51-71.86</td>
<td>0.050-0.080</td>
<td>0.05-0.06</td>
<td>19-40</td>
<td>25-99</td>
<td>52-2600</td>
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<td>SSS</td>
<td>9.49-17.61</td>
<td>0.040-0.090</td>
<td>0.05-0.80</td>
<td>44-98</td>
<td>60-95</td>
<td>208-572</td>
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<td></td>
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<td>16.99</td>
<td>0.050-0.120</td>
<td>0.04-0.05</td>
<td>23</td>
<td>100</td>
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<td>Road</td>
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<td>0.091</td>
<td>0.06</td>
<td>40-60</td>
<td>80-90</td>
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WP3: Sustainable green technologies and innovations

Task 2.4 Benchmark green corridors

WP3 Sustainable Green Technologies & Innovations

Task 2.5 Define areas for improvement

Task 5.2 Define & submit R&D call recommendations

Task 6.2 Policy Recommendations

Task 7.3 Conferences and presentations

ECITL conference, Thessaloniki, Oct. 13-14, 2011
WP4: Smart exploitation of ICT flows

Task 4.1
Identify smart ICT and available information flows

Task 4.2
Define application areas for smart ICT

Task 2.2
Define benchmark indicators

Task 4.3
Potential of Green Supply Chain Management

Task 2.4
Benchmarking green corridors

Task 4.4
Benchmark green corridors with smart ICT

WP 5
Recommendations for R&D calls

WP 6
Policy implications
Smart ways to get connected

• Give us a call or send an email!

• Send an email to supergreen@martrans.org
  (SuperGreen friends email list: keeping track of the project)

• Visit our web site www.supergreenproject.eu
PUBLIC DOCUMENTS

Deliverable D2.1 - Selection of Corridors
Deliverable D2.2 - Definition of Benchmark Indicators and Methodology
Deliverable D2.3 - Effects of changes in operational and regulatory environment
Deliverable D2.4 - Version 1 - Benchmarking of Green Corridors
Deliverable D2.4 - Version 2 - Benchmarking of Green Corridors
Deliverable D2.5 - Definition of Areas for Improvement
Deliverable D3.1 - Identify Green Technologies (Year 1)
Deliverable D4.1 - Identify smart ICT and information flows (Year 1)
Deliverable D4.2 - Define application areas for smart ICT

http://www.supergreenproject.eu/info.html
Linkedin and Facebook

- GREEN CORRIDORS GROUP @ Linkedin
- Friends of SuperGreen page @ Facebook
Thank You!

WWW.SUPERGREENPROJECT.EU